

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT (PCT Article 36 and Rule 70)

REC'D 20 JAN 2005

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Applicant's or agent's file reference PEB357	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/PEA/416)	
International application No. PCT/JP 03/10836	International filing date (day/month/year) 27.08.2003	Priority date (day/month/year) 28.08.2002
International Patent Classification (IPC) or both national classification and IPC F04D29/22		
Applicant EBARA CORPORATION et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 5 sheets, including this cover sheet.

☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

 These annexes consist of a total of 1 sheets.

3. This report contains indications relating to the following items:
 - I ☒ Basis of the opinion
 - II ☐ Priority
 - III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
 - IV ☒ Lack of unity of invention
 - V ☒ Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
 - VI ☐ Certain documents cited
 - VII ☐ Certain defects in the international application
 - VIII ☐ Certain observations on the international application

Date of submission of the demand 17.03.2004	Date of completion of this report 19.01.2005
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized Officer Giorgini, G Telephone No. +49 89 2399-7244 

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. **PCT/JP 03/10836**

I. Basis of the report

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

Description, Pages

1-11 as originally filed

Claims, Numbers

5-8 as originally filed

1-4 received on 03.12.2004 with letter of 03.12.2004

Drawings, Sheets

1/6-6/6 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
☐ the language of publication of the international application (under Rule 48.3(b)).
☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
☐ filed together with the international application in computer readable form.
☐ furnished subsequently to this Authority in written form.
☐ furnished subsequently to this Authority in computer readable form.
☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
☐ the claims, Nos.:
☐ the drawings, sheets:

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. **PCT/JP 03/10836**

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).
- (Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)*
6. Additional observations, if necessary:

IV. Lack of unity of invention

1. In response to the invitation to restrict or pay additional fees, the applicant has:
- ☒ restricted the claims.
 - ☐ paid additional fees.
 - ☐ paid additional fees under protest.
 - ☐ neither restricted nor paid additional fees.
2. ☐ This Authority found that the requirement of unity of invention is not complied with and chose, according to Rule 68.1, not to invite the applicant to restrict or pay additional fees.
3. This Authority considers that the requirement of unity of invention in accordance with Rules 13.1, 13.2 and 13.3 is
- ☐ complied with.
 - ☐ not complied with for the following reasons:
4. Consequently, the following parts of the international application were the subject of international preliminary examination in establishing this report:
- ☐ all parts.
 - ☒ the parts relating to claims Nos. 1-4,8 .

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	1-4,8
	No: Claims	
Inventive step (IS)	Yes: Claims	1-4,8
	No: Claims	
Industrial applicability (IA)	Yes: Claims	1-4,8
	No: Claims	

2. Citations and explanations

see separate sheet

Item V

V.1 The subject-matter of claim 1 meets the requirements of Art. 33(2) and (3) PCT.

Indeed, D1: FR 1002707 A, which is considered as the closest prior art, discloses a centrifugal impeller (see fig. 1) comprising a plurality of blades disposed between an inlet (f) and an outlet (f) and a shroud (a).

The technical problem underlying the invention is to reduce the relative velocity of the fluid flowing through the blades and, thereby, reducing the friction losses.

In the centrifugal impeller of claim 1, said technical problem is not addressed as the fluid is not allowed to reduce its velocity while passing through the passage because the inner surface of the lateral walls are substantially parallel to each other (see also page 2, lines 4-12).

Claim 1, instead, specifies that the shroud has a curved line so that the fluid path is widened in the middle of the fluid path.

V.2 Claims 2 to 4 and 8 meet the novelty and inventive step requirements of Art 33(2) and (3) PCT as they are formulated as depending on a claim which does meet said requirements.

V.3 The following objections are also raised:

- Independent claim 1 is not in the two-part form in accordance with Rule 6.3(b) PCT, which in the present case would be appropriate, with those features known in combination from the prior art (D1) being placed in the preamble (Rule 6.3(b)(i) PCT) and with the remaining features being included in the characterising part (Rule 6.3(b)(ii) PCT).
- The features of the claims are not provided with reference signs placed in parentheses (Rule 6.2(b) PCT).
- Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in the document D1 is not mentioned in the description, nor are these documents identified therein.

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/JP 03/10836

CLAIMS

1. (Amended) A centrifugal impeller comprising:

5 a plurality of blades disposed between an impeller inlet
and an impeller outlet;

a plurality of fluid paths for delivering a fluid from
said impeller inlet to said impeller outlet with the rotation
of said centrifugal impeller, each of said fluid paths being
formed between adjacent two of said blades; and

10 a shroud and a hub for forming said fluid paths;

wherein in a meridional-plane cross-section of said
centrifugal impeller, a curved line of said shroud, which forms
said fluid path, curves so as to project toward said hub in a
region from a blade inlet to a predetermined position of said
15 blade so that said fluid path is widened from said blade inlet
to said predetermined position, and said curved line curves so
as to project toward the opposite side of said hub in a region
from said predetermined position of said blade to a blade outlet
so that said fluid path is widened in a region downstream of
20 said predetermined position and narrowed in the vicinity of said
blade outlet.

2. A centrifugal impeller according to claim 1, wherein
said predetermined position of said blade is located near a center
25 of said blade in a meridional plane.

3. A centrifugal impeller according to claim 1 or 2, wherein
stream lines formed at a side of said hub and a side of said
shroud correspond to each other when viewed in an axial direction
30 of said centrifugal impeller.

4. A centrifugal impeller according to any one of claims
1 to 3, wherein a distance between adjacent two of said blades
is gradually increased from said blade inlet to said predetermined
35 position of said blade, and is decreased from said predetermined
position of said blade toward said blade outlet.